

than with us. It would seem that the greenness in the oysters from the river Roach in Essex is, however, entirely confined to the beard. The fact that another river (the Crouch), running into the Roach, possesses oysters with *white beards* only renders the whole question all the more curious and puzzling.

Meanwhile, until the actual properties of green oysters which are neither plucked from the keels of ships nor fished up near the copper-mines at Falmouth shall be discovered, we advise any of our readers who are at all inclined to be nervous on the subject to remember the valuable test afforded by ammonia, and add a small bottle of it to the usual pepper and vinegar accessories, to be used in a case of doubt—though, if they have a mind to eat the oyster in case their suspicions should prove groundless, we would recommend the simple ordeal of the sewing-needle as the more suitable.

XXXII.—*Notes on the Skulls of Sea-Bears and Sea-Lions (Otaridæ) in the British Museum.* By Dr. J. E. GRAY, F.R.S. &c.

THE "Prodrôme of a Monograph of the Pinnipedes" by Mr. Theodore Gill, wherein he named several genera of this group, and a paper by Dr. Peters on the *Otaridæ* in the Berlin Museum, in the 'Monatsbericht' for May of this year, have induced me to re-examine the skulls and skeletons in the British Museum; and I herewith send you the result of my observations. I may observe that Dr. Peters considers all the Eared Seals one genus, but has divided them into seven subgenera, to each of which he gives a distinctive name. Dr. Peters's paper is interesting as determining the specimens described by Pander and D'Alton, Johann Müller, and other German naturalists, as well as describing the more recently received specimens in the Berlin Museum, which certainly is one of the most important on the continent.

Capt. Thomas Musgrave, in a work entitled "Cast away on the Aucklands," 12mo, 1866, pp. 141 and following, gives a very interesting account of the habits and manners of the Lion Seal, showing how unlike they are in their habits to the Seals without ears (*Phocidæ*). The female brings forth her young far inland, and has to teach them to take to the water which is to be their future home.

Capt. Weddell gives nearly the same account of the habits of the Fur-Seal, as does also Mr. Hamilton (in *Ann. & Mag. Nat. Hist.* 1839, p. 87).

Unfortunately, having no skull or other parts of the Lion Seal of the Auckland Islands (the most southern of the New-

Zealand group), we are not able to determine whether it is the same species as the *Otaria jubata*, the Sea-Lion of the southern end of the American continent, or whether it is the Sea-Lion of the southern end of the African continent (*Arctocephalus Delalandii*), or the Sea-Lion of the Northern Australian seas (*Neophoca lobatus*).

According to the observations of Dr. Peters, founded on the examination of the typical skulls, *Otaria ursina* of Nilsson and *Otaria Lemarii* of J. Müller (Arch. f. Naturg. 1841, p. 334) include the *Arctocephalus Delalandii* from South Africa and *A. cinereus* of Australia.

*Otaria Stelleri* of Schlegel (Fauna Japonica, t. 22. f. 55) includes both the Australian Eared Seals, viz. *Arctocephalus cinereus* and *Neophoca lobata*; and it is quite distinct from the *Otaria Stelleri* of Lesson and J. Müller, which is a combination of the Sea-Bear and Sea-Lion of Steller (that is to say, *Eumetopias Stelleri* and *Callorhinus ursinus*).

The males of these animals are described as twice as long and broad (that is, four times as large) as the females. This may explain the difference in size of the skulls from the same localities.

The fur changes its colour as the animal grows, the young being generally black; and the adult males and females also differ considerably in the colour of the fur.

The Eared Seals (Otariadæ) must be considered a distinct family from the Earless Seals (Phocidæ). They have more power of using their limbs like the more typical mammalia, walking on them with the body raised from the ground; they rest with the hind limbs bent forwards. These habits are well shown in Dr. Forster's figures, engraved by Buffon; and they have been verified by the study of the living Eared Seal in the Zoological Gardens. Their scrotum and genital organs are exposed as in the Dog.

The Morse is intermediate between the Eared and the Earless Seals in several particulars. It rests with its hind limbs bent forwards, but it does not use its limbs so freely as the Eared Seals. Some of the older naturalists correctly figured the attitude of the Morse when at rest, as shown in my paper on the figures of that animal (Proc. Zool. Soc. 1853, p. 112). Buffon, misled by the animal-preservers, figures it with the limbs extended behind. Pander and D'Alton represent the animal and the skeleton in their proper position; but they represent the skeleton of the Eared Seal with its hind limbs extended backwards, though the articulating surfaces of the bones of the legs should have shown an anatomist that this is not the natural position in either the Morse or the Eared Seal. Mr. Gould, in his 'Mammalia of

Australia,' erroneously figures Eared Seals with the attitudes of the Earless ones.

I. *The palate produced behind to a line with the condyles. It is deeply concave behind, and becomes deeper as the animal increases in age. The hinder nostril is short, with a truncated front edge.*

### 1. OTARIA, Gray, Gill, and Peters.

*Platyrrhynchus*, F. Cuvier.

Grinders 6/6. In the adult skulls the fourth upper grinder is under the front edge of the orbit, and the sixth or last in a line with the back edge of the zygomatic arch. The hinder edge of the palate is in a line with the condyles, and truncated.

In the skull of the younger animal, about 8 inches long, the hinder edge of the palate is rather in front of the line of the condyles. The upper grinders are also differently disposed: the third upper grinder is under the front edge of the orbit, and the fifth tooth is in a line with the back edge of the zygomatic arch, and the last or sixth tooth is far behind it. The teeth in the younger skull are more lobed than in the adult. This change is remarkable, as the teeth of the young and the adult *Zalophus Gilliespii* are similar in number and position.

*Otaria jubata*. Southern Sea-Lion.

*Phoca jubata*, Forster.

*Otaria leonina*, Péron.

*O. chilensis*, J. Müller.

*Hab.* South America, Falkland Islands, Chili.

The oldest of the three adult skulls in the British Museum differs from the other two in the pterygoid processes of the hinder edge of the palate being closer together than in the rest; but this character seems to depend on the greater age of the animal, as it differs slightly in the two other specimens.

In all the younger specimens, varying greatly in size, the pterygoid processes are far apart.

Dr. Peters considers (1) *Platyrrhynchus leoninus* of F. Cuvier, (2) *Phoca Byronia* of Blainville, and (3) an adult specimen which is in the Hamburg Museum, and of which he described and figured the skull as *O. Geoffroyia*, to be distinct species.

I cannot see any difference between the skull in the College of Surgeons, on which *Phoca Byronia* was founded, and those in the British Museum; and the figure of the skull described as *Otaria Geoffroyia* is very similar to the skull in the British Museum collection which I have called *O. jubata*.

II. *The palate rather produced behind. The front edge of the hinder nasal opening in a line with the middle of the zygomatic arch.*

A. *The grinders 5/5, the fourth upper (in adult) under the front edge of*

the orbit, and the last in front of the back edge of the zygomatic arch. *Zalophina*.

In the younger skull the grinders are placed rather further back, the hinder part of the upper grinder being behind the back edge of the zygomatic arch. The grinders all single-rooted, as the last or sixth grinder in each jaw, which is generally two-rooted, is absent. The face of the skull is considerably produced, and the forehead is flat.

## 2. *ZALOPHUS*, Gill, Peters.

*Arctocephalus* § *b*\*\* , Gray, Cat. Seals & Whales, p. 55.

Palate concave, narrow in front, wider at the line of the last grinder, and then contracted behind. The hinder nares narrow, elongate, twice as long as wide, acutely arched in front, front edge in a line with the front edge of the orbital process of the malar bone.

### *Zalophus Gilliespii*, Gill. .

*Otaria Gilliespii*, Macbain & Peters.

*Arctocephalus Gilliespii*, Gray, P. Z. S. 1859, t. 70 (skull).

*Hab.* California. Brit. Mus.

## 3. *NEOPHOCA*.

*Arctocephalus* § *b*\*\*\* , Gray, Cat. Seals & Whales, p. 57.

*Otaria*, § *Zalophus*, part., Peters.

Palate concave, broad, as broad before as at the hinder part of the tooth-line, then rather suddenly contracted. The hinder nares broad, rather longer than broad, with the front edge broadly arched, which is further back than the front edge of the orbital process of the zygomatic arch, or malar bone, which is thick and flat.

### *Neophoca lobatus*. Australian Hair-Seal.

*Arctocephalus lobatus*, Gray, Spic. Zool. 1828, t. 4, f. 2 (teeth); Zool. E. & T. Mamm. t. 16, 17. f. 3-5 (skull); Gray, Gould, Mamm. Austr. iii. t. 49; Peters.

*Otaria australis*, Quoy & Gaim. Astrol. t. 14, 15. f. 3, 4 (skull).

*Otaria Stelleri*, Schlegel, Abbild. t. 22. f. 1-4.

*Arctocephalus australis*, Gray, Cat. Seals & Whales, p. 57.

The upper grinders all single-rooted, the root of the two last (the fourth and fifth) being rather compressed, with an obscure central longitudinal groove on the inner side; the two front grinders of the lower jaw with oblong, the three last with compressed roots, and the fourth and fifth with a slight longitudinal central groove on the sides.

In the younger skulls the roots of the grinders are more oblong, less compressed, and do not show the lateral grooves, as far as the teeth can be seen without being drawn from the sockets.



In the front part of the younger skull, which was received from Mr. Gould, the teeth are placed rather further back than in the adult skull from North Australia received from Capt. Grey, the hinder part of the fifth tooth being behind the back edge of the zygomatic arch.

#### 4. ARCTOPHOCA, Peters.

Dr. Peters described this subgenus from a specimen sent from Chili by Dr. Philippi. It chiefly differs from *Zalophus* in the palate being much narrower, but rather wider behind, and the teeth rather far apart. I have not seen any skull agreeing with these characters.

*Arctophoca Philippii*, Peters, Monatsb. 1866, p. 276,  
t. 2 A, B, C (skull and teeth).

*Hab.* Juan Fernandez. Dr. Philippi, Mus. Berlin.

According to the figures, the form of the skull and the large size of the orbit are very similar to those of *Phocarcos Hookeri*; but the number and form of the teeth are different.

B. *The grinders 5/5, the third upper being under the front edge of the orbit, the last or fifth separated from the rest by a broad space and placed far behind the back edge of the zygomatic arch; the hinder grinders two-rooted.*

#### 5. EUMETOPIAS, Gill, Peters.

*Arctocephalus* § a\*\*\*, Gray, Cat. Seals & Whales, p. 51.

Palate flattish or rather concave in front, as wide in front as at the end of the tooth-line, and then slightly narrowed behind. Posterior nares oblong, elongate, broadly truncated in front, the front edge being behind the line of the orbital process of the zygomatic arch. The grinders have large oblong roots; the second, third, and fourth upper ones have a subcentral longitudinal groove on the outer side, and a less marked one on their inner surface; the inner side of all but the first of the lower ones are similarly grooved; the fifth upper grinder (or more properly the sixth in the normal series) has two distinct roots. The lower jaw much more elongate than that of *Otaria jubata*, the hinder angle more oblique, and the lower margin long and straight.

The skull of the young animal, which was sent by Mr. A. S. Taylor to Mr. Gurney from California, and which I first described, with doubt, as *A. Monteriensis*, junior (P. Z. S. 1859, p. 357), and which in the 'Catalogue of Seals and Whales' I named *Arctocephalus Californianus* (see p. 51), agrees in every respect in its dentition with the large skull which we received from California, and which I described and figured as *A. Monteriensis* (P. Z. S. 1859, p. 358, t. 72); but it differs greatly in

the form of the hinder nares, which are extended much more forwards, so that the front end, which is very narrow and acute, is much in front of the prominence of the orbit of the zygomatic arch, being, in fact, about in a line with the middle of the lower edge of the orbital concavity.

This skull is evidently that of a very young animal, for the bones are separate; but it has the same number and disposition of the teeth as the large skull. There is the same wide space between the fourth and fifth upper grinders; but there is at the back edge of the fourth grinder, on the right side of the skull, a small pit, from which, no doubt, a small rudimentary tooth has fallen out; and there is a much wider but shallow pit on the other side, which may have been produced by the loss of a rudimentary tooth; the last upper grinder has a large swollen undivided root. If this is a young skull of *Eumetopias Monterienseis*, that species is curious for having the teeth in the old and young skulls in the same situation as regards the bones of the face.

The adult skull and the young one were from the same locality, and, I believe, collected by the same person; and this being the case, I am inclined to regard them as the same, only showing a curious peculiarity in the growth of the animal, and also showing that the form and position of the hinder nostril probably varies as the animal increases in age.

*Eumetopias Stelleri*. Northern Sea-Lion or Fur-Seal.

*Arctocephalus Monterienseis*, Gray, P. Z. S. 1859, t. 72 (skull).

*Eumetopias Californiana*, Gill.

*Otaria Stelleri*, Gray; Peters; Müller?

*Leo marinus*, Steller.

*Phoca jubata*, Pander & D'Alton, t. 3. f. d, e, f (skull, not good).

*Phoca Californica* et *P. Stelleri*, Fischer.

*Lion marin de la Californie*, Chloris, Voy. Califor. t. 11.

*Hab.* California; Behring's Straits.

The Sea-Lion of Steller has been one of the zoological paradoxes. Professor Nilsson, like most preceding authors, regarded it as a variety of the *Otaria jubata*; and therefore I supposed it might be a second species of the restricted genus *Otaria*. Dr. Peters has solved the enigma by uniting it to the Seal which I described from California, observing that the skull in the Berlin Museum, figured by D'Alton under the name of "Steller's Sea-Lion" (*Phoca jubata*), was received from Kamtschatka, and a second skull of an old male in the Berlin Museum was received from M. Brandt as coming from Behring's Straits.

It is to be regretted that these skulls escaped the researches of Professor Nilsson, who visited most museums in Europe to examine the typical specimens.

The specimen of *Callorhinus ursinus*, now in the Museum, was received from St. Petersburg as *Otaria leonina*, or *Leo marinus*

of Steller, from Behring's Straits; so they evidently confound two species under that name.

The figure of Pander and D'Alton is so imperfect that it would have been impossible to determine the species it represents without the examination of the original skull, and then one sees that it might be intended for the species to which it is referred. The same observation is applicable to the figure of the skull of Steller's Sea-Bear.

C. *The grinders 6/5, the third upper under the front edge of the orbit, the fifth and sixth behind the back edge of the zygomatic arch; the upper hinder grinders two-rooted.*

## 6. PHOCARCTOS, Peters.

*Arctocephalus* § II., Gray, Proc. Zool. Soc. 1859, p. 109.

The skull elongate, forehead flat. The palate concave, deep, with a thickened margin on each side in front, widest in the middle part of the tooth-line, and gradually narrowed behind the teeth; the internal nares oblong, longer than broad, truncate in front, the front edge in a line with the orbital process of the zygomatic arch. Grinders large, compressed; the fifth and sixth upper behind the back edge of the zygomatic arch. The grinders have compressed roots; some of them have a very indistinct longitudinal groove on the side; the fifth upper grinder has two distinct roots. The ear-bones scarcely prominent, with a flat lower surface.

I have not seen an adult skull of this genus. The skulls described are 10 inches long, but the bones are not knit.

*Phocarcetos Hookeri*, Peters, Monatsb. 1866, p. 262.  
The Southern Hair-Seal.

*Arctocephalus Hookeri*, Gray, Zool. E. & T. t. 14, 15 (skull.)  
The *Hair-Seal* of the sealers.

*Hab.* Falkland Islands and Cape Horn.

The skull of the young animal described and figured by Dr. Burmeister as *Arctocephalus Falklandicus* (Ann. and Mag. N. H. 1866, xviii. p. 99, t. 9. f. 1 & 2) is probably the young skull of this species. It agrees with it in the elongated form of the skull, and in the large size and great development of the processes of the orbits.

Dr. Peters regards the *Otaria Ulloæ* of Von Tschudi (Fauna Peruana, p. 136, t. 3) as a second species of this group. There are two skulls which he refers to it in the Berlin Museum.

## 7. CALLORHINUS, Gray, P. Z. S. 1859, p. 359; Peters.

*Arctocephalus*, Gill!

Skull elongate; forehead rounded in front of the orbit, rather swollen. Palate rather concave, as wide in front as at the end of the tooth-line, rather narrowed behind. The sixth upper

grinder just behind the hinder edge of the zygomatic arch; the grinders moderate, fifth and sixth upper and the fifth lower with two diverging roots.

*Callorhinus ursinus*, Gray, P. Z. S. 1859, p. 359, t. 58 (skull).  
Northern Sea-Bear.

*Ursus marinus*, Steller.

*Phoca ursina*, Linn.; Pander & D'Alton, t. 7. f. 1 (not good).

*Otaria ursina*, Péron; Peters.

*O. Kraschennikowii*, Lesson.

*O. Stelleri*, part., Lesson & Müller.

*Hab.* Kamtschatka. B. M.

D. Grinders 6/6, the third upper grinder under the front edge of the orbit, the hinder ones far back behind the back edge of the zygoma. Arctocephalina.

### 8. ARCTOCEPHALUS, F. Cuvier, Peters.

*Halarctus*, Gill.

The face of the skull elongate; forehead flat. The palate concave, especially in front, with a thickened margin on each side near the teeth, about as wide in front as between the hinder teeth, and then narrowed behind; the internal nasal opening elongate, longer than broad, narrow and arched in front, the edge in a line with the orbital process of the zygomatic arch, which is large and well developed.

In the adult skull of *A. Delalandii* from the Cape the fifth hinder grinder has only very short rounded callous roots, which are slightly divided into two lobes; and the hinder or sixth upper grinder seems to have a root of the same character. But not having any skulls of younger animals, I am not able to describe what are the forms of the root of these two teeth in the younger state.

In the skulls of the other species (which are not adult, as they have the sutures between the bones still distinct), the fifth and sixth upper grinders have two distinct diverging roots.

\* *The fifth and sixth upper grinders with two roots(?); the sixth upper partly behind the hinder edge of the zygomatic arch.* Arctocephalus. (Africa.)

1. *Arctocephalus Delalandii*, Gray, P. Z. S. 1859, t. 69 (skull).  
The Cape Fur-Seal.

*Phoca ursina*, F. Cuvier, Oss. Foss. t. 219. f. 5.

*Arctocephalus ursinus*, F. Cuvier.

*Otaria ursina*, Nilsson.

*O. Peronii*, Desm.

*O. Delalandii*, F. Cuvier.

*O. pusilla*, Peters.

JUNIOR. *Petit Phoque*, Buffon, H. N. xiii. t. 53 = *Phoca pusilla*, Schreb.

*Hab.* South Africa, Cape of Good Hope.



The two adult skulls in the British Museum differ greatly in the width of the hinder nasal opening, in the form of the hinder lower lateral processes of the occipital bone, in the form of the back of that bone, and in the shape of the condyles.

\*\* *The fourth, fifth, and sixth upper grinders with two distinct diverging roots; the fifth in a line with the hinder edge of the zygomatic arch.* Euotaria. (America.)

2. *Arctocephalus nigrescens*, Gray, Cat. Seals & Whales, p. 52.  
The Southern Fur-Seal.

*Hab.* Falkland Islands?

The two skulls of this species in the British Museum agree in most particulars; but they differ considerably in the form of the hinder nostrils. The larger one is without its upper teeth, but the form of the roots are well exhibited by their sockets; the front edge of the hinder nasal opening is produced rather further forward, and is acutely angular. The other skull, which is rather small and has the teeth in a good condition, has the hinder nasal opening with a slightly arched, nearly truncated, front edge.

Dr. Peters refers *Phoca Falklandica* (Shaw, Zool. i. p. 256) and *Otaria Falklandica* (Hamilton, Ann. & Mag. N. H. 1839, p. 81, t. 4; Jardine, Nat. Lib. vi. p. 271, t. 25) to this species. But as neither Dr. Shaw nor Dr. Hamilton describes the number or position of the teeth, it is not possible to determine if this is the *Fur-Seal* of the sealers, collected at the Falkland Islands, more especially as the fact of the skull coming from the Falkland Islands is not well ascertained. See the other synonyma which have been established on the sealers' descriptions and figures or the skins collected for the furriers at the Falkland Islands (Gray, Cat. of Seals & Whales, pp. 55, 56). Dr. Hamilton, who prides himself on his figure, represents the hind legs as extended behind; but they look very awkward in that position, the stuffer having evidently had a difficulty in extending them.

\*\*\* *Fourth, fifth, and sixth upper grinders with two diverging roots; the fifth upper grinder entirely behind the hinder edge of the zygomatic arch. The palate narrow.* Gypsophoca. (Australia.)

3. *Arctocephalus cinereus*, Gray, Cat. Seals & Whales, p. 56.  
Australian Fur-Seal.

*Otaria cinerea*, Péron?; Quoy & Gaimard, Voy. Astrol. p. 89, t. 12, 13, 15 (animal and skull); Peters, Monatsb. 1866, p. 272.

*Arctocephalus nigrescens*, b & c, Gerrard, Cat. Bones B. M. p. 147.

*Black Seal, Otaria*, Cat. Sydney Museum, ii. p. 36.

*Hab.* Australia. John Macgillivray.

Black, greyer beneath; under-fur abundant, reddish brown.

There are the stuffed skin, with its skull, and the bones of the

face of another young specimen of this Seal in the British Museum, collected in the Australasian Sea by Mr. John Macgillivray.

The Eared Seals are collected for their oil and skins. Most of the species have very dense under-fur of soft erect hairs between the base of the longer hairs. These are called "Fur-Seals;" and the skins, when deprived of their long hairs, are very valuable. The dressed furs of the various species and localities are of very different commercial and economic value. The skins of *Neophoca lobata* of Australia and *Phocarcotos Hookeri* of the Southern Ocean, being destitute of this under-fur, are called *Hair-Seals* by the sealers. Their skins are of little comparative value, as they are only used like the skins of the Earless Seals (Phocidæ).

I have not been able to identify the "Tiger Seal" of Musgrave ('Cast away on the Auckland Islands,' pp. 7, 10, 18, 29, &c.), which seems as abundant as the Sea-Lion of the same locality. They are both probably undescribed.

XXXIII.—*Recent Researches on the Fossil Fishes of Mount Lebanon.* By MM. F. J. PICTET and A. HUMBERT\*.

THAT the fossil fishes of the coasts of Syria are among those which have been longest known is shown by the mention of them in De Joinville's 'Histoire de Saint-Louis.' This chronicler tells us that, during the sojourn of the Crusaders at Sayette (the ancient Sidon, now *Saida*), "A certain marvellous stone was brought to the king, in appearance like a quantity of scales, of the which when one was raised you saw beneath, between the two stones, the shape of a fish of the sea. And the fish was of stone, but nothing of its form was wanting, neither eyes, nor fins, nor colour, any more than if it had been living. The king asked for one of these stones, and found a tench in it, of a brown colour and like any other tench."

Various travellers, such as J. Korte, C. Lebrun, Volney, &c., have also mentioned these fishes; but Scheuchzer is the oldest naturalist who, as far as we know, has paid any attention to them. In his work '*Piscium Querulæ et Vindicis*,' published at Zurich in 1708, we find a passage devoted to the fish figured in Lebrun's '*Voyage*' (Cornelius de Bruyn), and another referring to a specimen in the Woodward Collection. The Zurich natu-

\* Translated by A. O'Shaughnessy from a separate impression, communicated by the Authors, from the 'Archives des Sciences de la Bibliothèque Universelle,' Geneva, June 1866. See also '*Nouvelles Recherches sur les Poissons Fossiles du Mont Liban*,' 1 vol., with plates, by F. J. Pictet and A. Humbert: Geneva, 1866.